

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



November 08, 2019

MATERIALS LABORATORY FACTUAL REPORT

Report No. 19-061

A. ACCIDENT INFORMATION

Place : Catalina Island, California
Date : June 17, 2019
Vehicle : Robinson R-44
NTSB No. : WPR19FA175
Investigator : Maja Smith AS-WPR

B. COMPONENTS EXAMINED

1. Crankshaft gear with fractured dowel pin and associated mounting bolt/retaining clip.

C. DETAILS OF THE EXAMINATION

The as-received crankshaft gear with fractured dowel pin and associated mounting bolt/retaining clip are shown in Figures 1 and 2. The components exhibited a uniform layer of corrosion product on all surfaces. The purpose of this report is to document the fracture mode of the dowel pin.

The crankshaft gear with fractured dowel pin was immersed in Evapo-Rust® (Springdale, AR), a chelating cleaner developed to remove ferrous corrosion product, for about 2 hours with 40 minutes of ultrasonics at room temperature.

Close views of the fracture surface of the dowel pin after removal of the corrosion product are shown in Figures 3-5. Figures 3b and 4 shows the presence of shear burrs on the fracture surface as well as a rounded leading edge. The direction of fracture is also indicated.

A profile view of the fractured dowel pin is shown in Figure 5. Deformation damage to the shank of the down pin is shown in Figure 5b. This deformation damage is consistent with application of a shearing force in the direction indicated in the figure.

Due to the extent of material loss due to corrosion, the micro-fracture mode could not be documented. However, the macro-fractographic features are consistent with shear overstress fracture in the direction indicated in Figure 5b.

Michael Budinski
Chief, Materials Laboratory Division

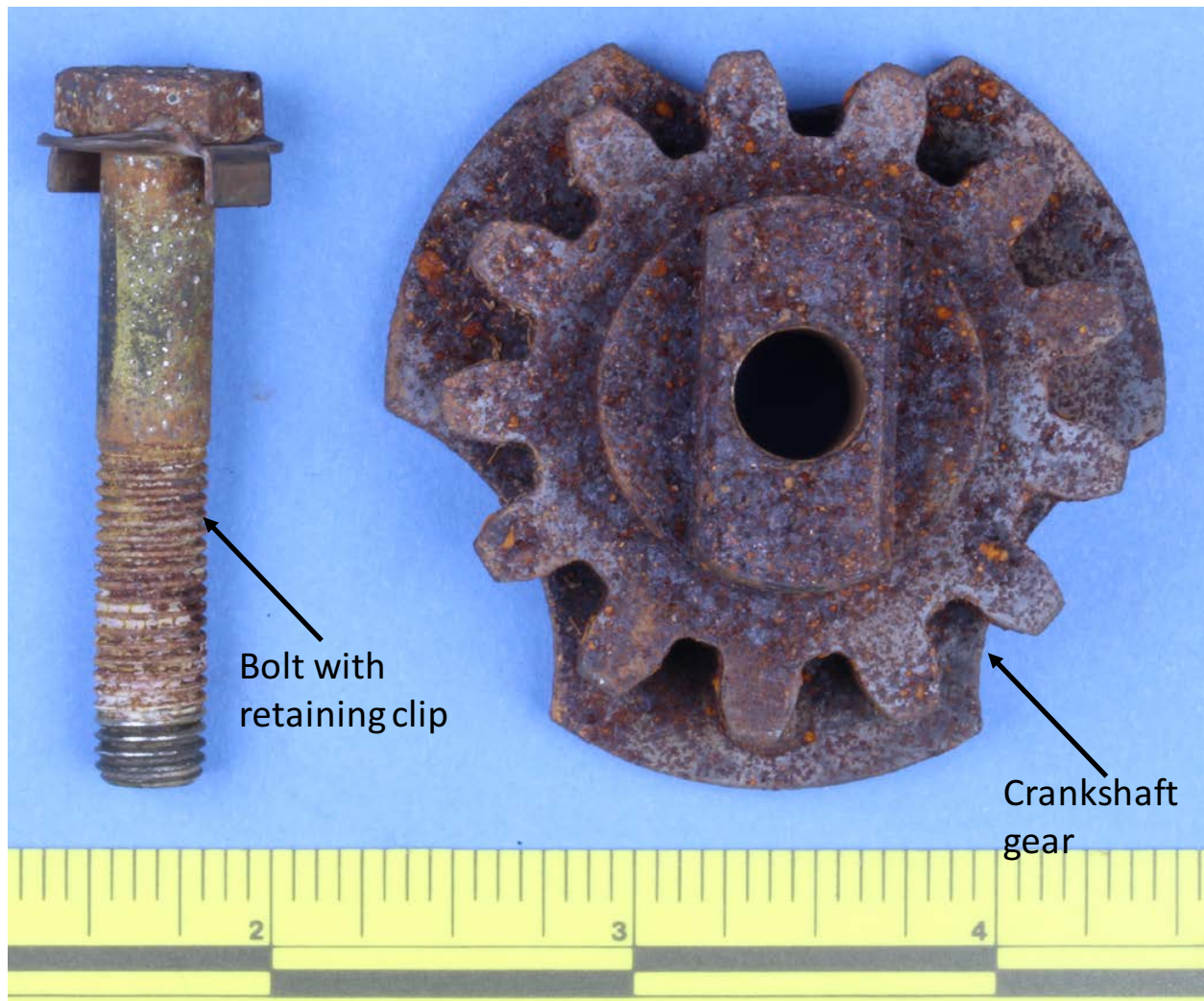


Figure 1 The as-received crankshaft gear with fractured dowel pin and associated mounting bolt/retaining clip.

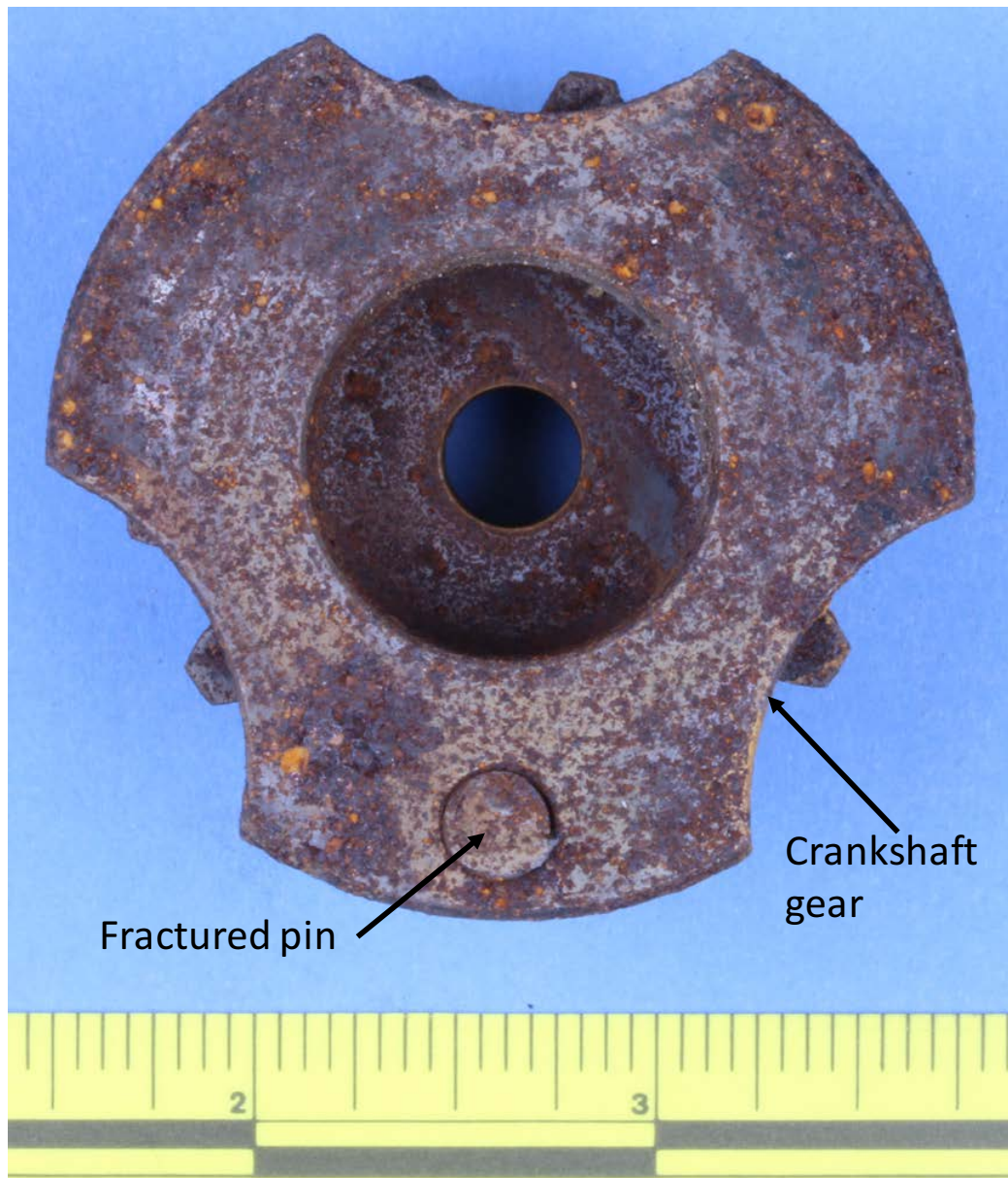


Figure 2 Image of the reverse side of the crankshaft gear showing the fracture surface of the dowel pin.

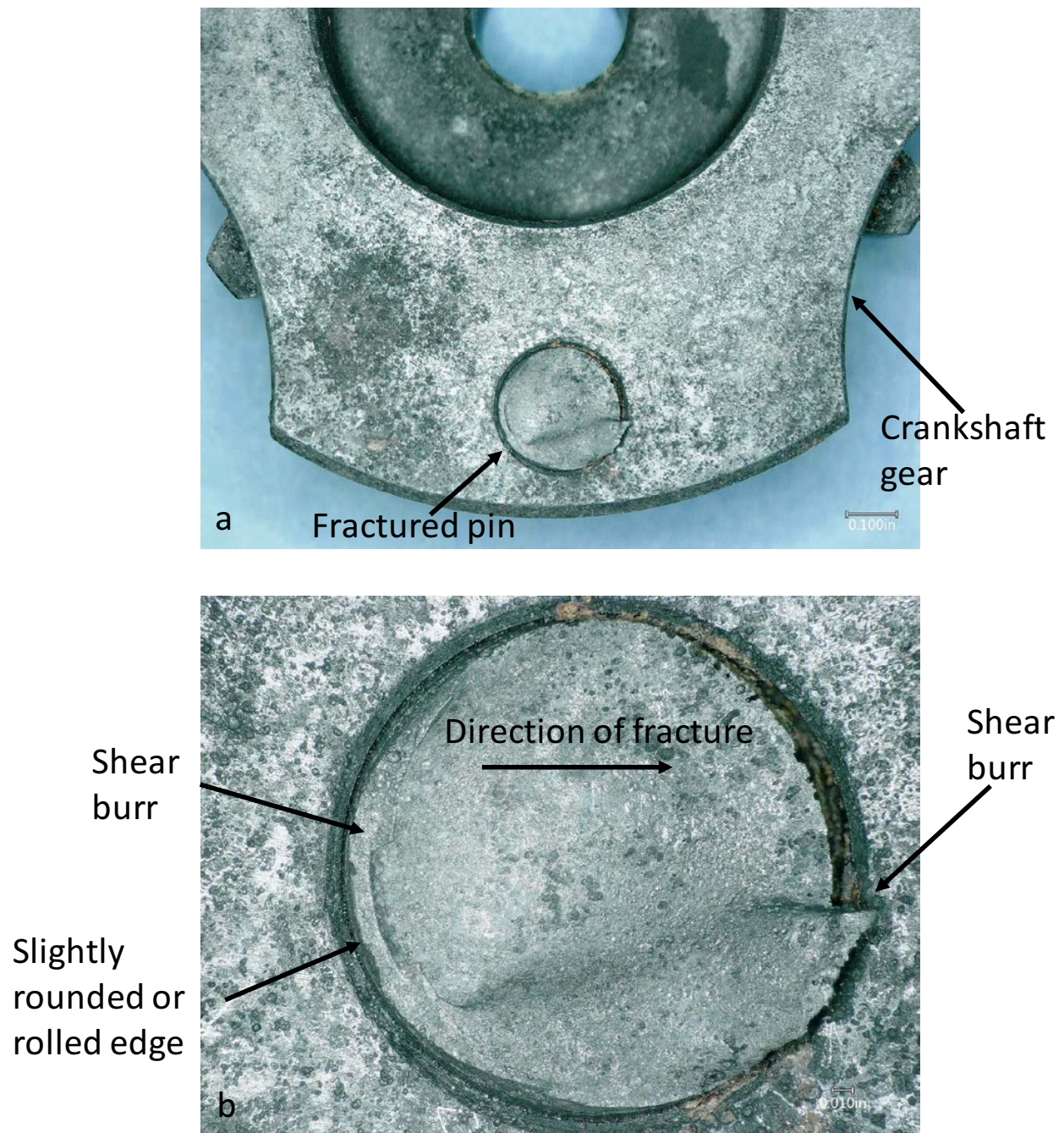


Figure 3 Close digital-microscope top-down images of the fracture surface of the dowel pin. The surfaces have been cleaned with Evaporust. Key fracture features are identified.

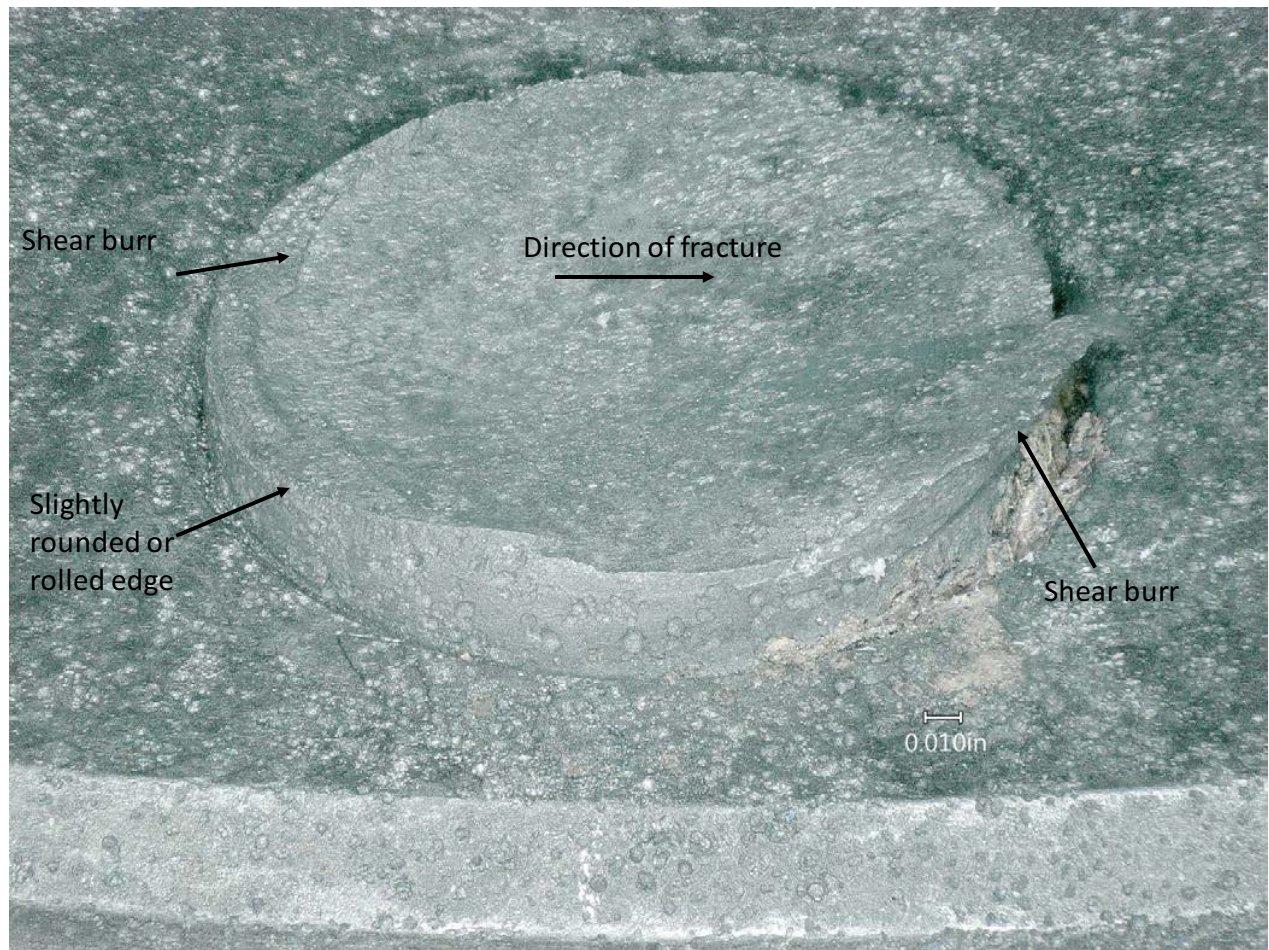


Figure 4 Close digital-microscope oblique-image of the fracture surface of the dowel pin. The surfaces have been cleaned with Evaporust and fine pits are evident. Key fracture features are identified.

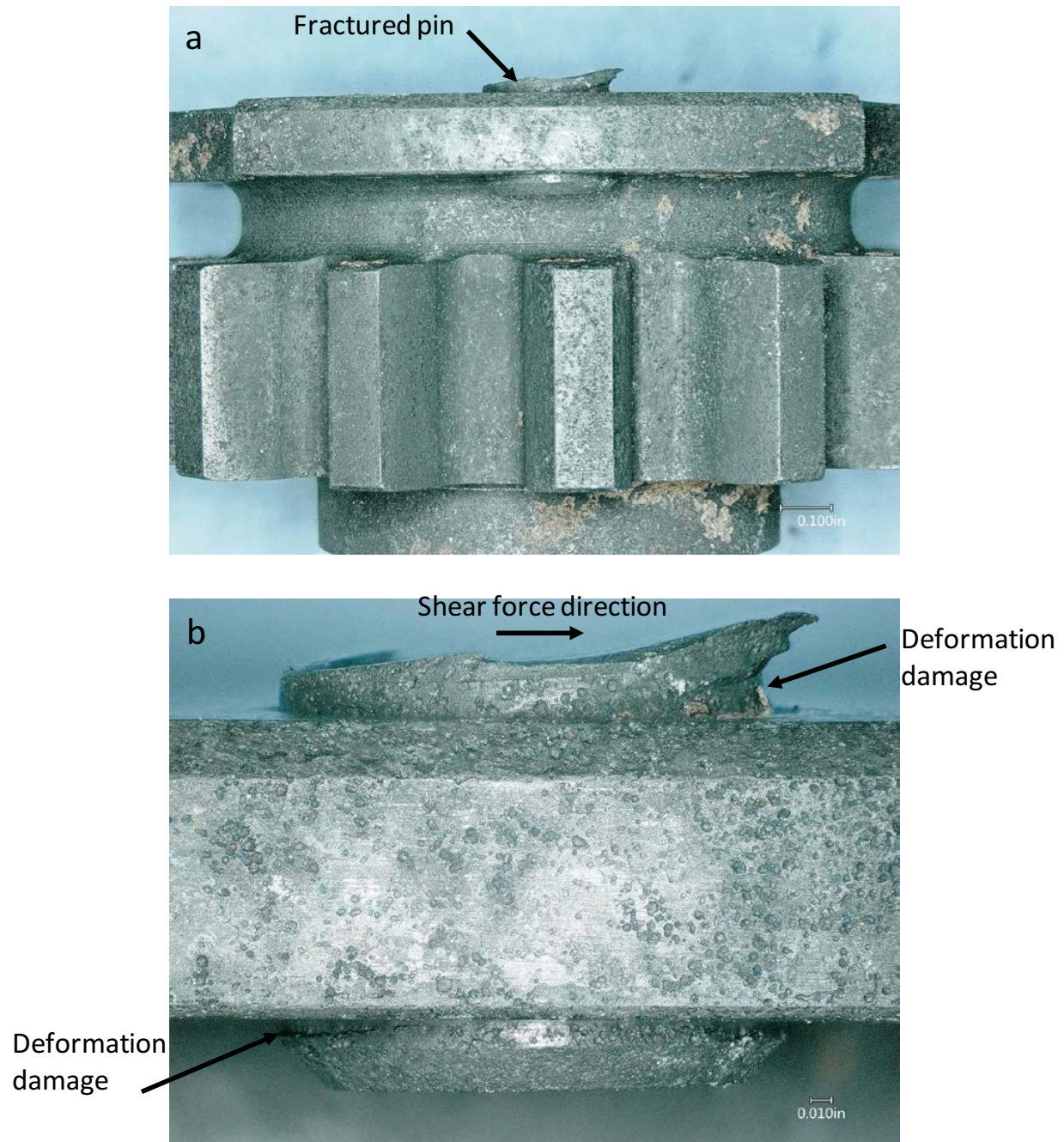


Figure 5 Close digital-microscope profile-views of the fracture surface of the dowel pin. The surfaces have been cleaned with Evaporust and fine pits are evident. Key fracture features are identified.